

Southern Regional High School District Course of Study

Family and Consumer Sciences

Course Title: FOOD SCIENCE and PREPARATION 8080
WRITTEN BY PATRICIA PENN JUNE 2008

Essential Questions of the Course:

- 1. What does science have to do with food preparation?**
- 2. What are the career opportunities involved with food science?**
- 3. How does the physical structure and chemical composition of food affect its use, preparation, and care?**
- 4. How can recipes be modified to enhance nutritional value and taste of food?**
- 5. What evaluative standards are used to evaluate foods?**
- 6. What methods can be used to store and preserve foods?**

Assessments:

- 1. Evaluate the preparation of different culinary techniques according to scientific terms.**
- 2. Conduct a variety of experiments developing a deeper understanding of the preparation, processing, evaluation, and utilization of foods.**
- 3. Teacher assessment through tests.**

Unit Title: Introduction to Food Science**Essential Questions of the Unit:**

- 1. What is food science?**
- 2. What type of equipment is needed in this course?**
- 3. What procedures should be used for safety?**
- 4. How are the five senses used in food evaluation?**
- 5. What scientific words are necessary to know?**
- 6. How does energy relate to food?**
- 7. What are solutions, colloidal dispersions and emulsions?**
- 8. What careers are available to people who study Food Science?**

Assessments:

- 1. Teacher assessments through tests.**
- 2. Evaluation of food preparation with experiments.**
- 3. Description of sensory evaluation of a meal.**

Content:**Food Science**

- A. Definition**
- B. Equipment used**
- C. Safety – spoilage and poisoning**
- D. Sensory evaluation of food**
- E. Basic science definitions**
- F. Solutions, colloidal dispersions and emulsions**
- G. Energy**
- H. Careers**

Skills:

Basic skills – scientific

Verbal skills – discussing sensory descriptions of food

Analytical – identifying safety hazards

Purpose / Rationale of the unit:

Is to recognize the scope of food science and understand the terms used in food science.

Students will gain ability to work safely in the food lab, identify food hazards and safely operate equipment.

Students will be able to use a variety of adjectives to describe food evaluation.

Identify careers pertaining to food science.

Recognize the importance of energy in food preparation.

New Jersey Core Curriculum Content Standards:

CROSS-CONTENT WORKPLACE READINESS SKILLS

3	All students will use critical thinking, decision-making, and problem-solving skills.
3.1	Recognize and define a problem, or clarify decision to be made
5	All students will apply safety principles.
5.1	Explain how common injuries can be prevented.
5.2	Develop and evaluate an injury prevention program.
5.3	Demonstrate principles of safe physical movement.
5.4	Demonstrate safe use of tools and equipment.
5.5	Identify and demonstrate the use of recommended safety and protective devices.
4.9	All students will develop an understanding of and will use measurement to describe and analyze phenomena.

MATHMATICS

4.2.9	Formulate questions, conjectures, and generalizations about data, information, and problem situations.
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SCIENCE

5.2	All students will develop problem-solving, decision-making, and inquiry skills, reflected by formulating usable questions and hypotheses, planning experiments, conducting systematic observations, interpreting and analyzing data, drawing conclusions, and communicating results.
5.2.2	Develop strategies and skills for information-gathering and problem-solving, using appropriate tools and technologies.
5.2.6	Identify problems that can be solved by conducting experiments.
5.5.2	Use a variety of measuring instruments, emphasizing appropriate units.
5.8	All students will gain an understanding of the structure and behavior of matter.
5.8.1	Describe and sort objects according to the materials from which they are made and their physical properties.
5.8.2	Recognize that matter can exist as a solid, liquid, or gas, and can be transformed from one state to another by heating or cooling.
5.9	All students will gain an understanding of natural laws as they apply to motion, forces, and energy transformations.
5.9.4	Investigate sources of heat and show how heat can be transferred from one place to another.

CAREER EDUCATION AND CONSUMER, FAMILY AND LIFE SKILLS

9.2	Demonstrate critical life skills in order to be functional members of society.
A	Critical Thinking
9.2.1	Apply communications and data analysis to the problem-solving and decision making processes in a variety of situations.
F	Safety
9.2.1	Engage in an informed discussion about rules and laws designed to promote safety and health.
9.2.2	Describe and demonstrate basic first aid and safety procedures.
9.2.3	Analyze the occurrence of workplace hazards.
9.2.4	Practice the safe use of tools and equipment.
9.2.5	Implement safety procedure in the classroom and workplace, where appropriate.

Time Frame of Unit:
10 weeks

Instructional Activities:

- 1. Teacher oriented work sheets.**
- 2. Experiments in the foods lab.**
- 3. Collection of bacteria samples for food safety.**
- 4. Discussion of careers.**
- 5. Class evaluations of each of the five senses.**

Materials and Resources:

Food Science and You chapters 1,2,3,4,13,17, 23

Video – Food Borne Illness
Science from School to work

Food laboratory and equipment

Unit of Study

Unit Title: The Science of Nutrition

Essential Questions of the Unit:

- 1. What foods are carbohydrates?**
- 2. How are carbohydrates prepared?**
- 3. When is calibrating a thermometer important in food preparation?**
- 4. What are the properties and composition of lipids?**
- 5. How is fat used in food preparation?**
- 6. Can protein be tenderized?**
- 7. What foods contain protein?**
- 8. What are the best methods of preparing proteins?**
- 9. Is water a food preparation essential?**
- 10. What are vitamins and minerals?**
- 11. What affects metabolism?**

Assessments:

- 1. Teacher assessment through tests.**
- 2. Evaluation of food preparation by the student and teacher.**
- 3. Assessment of food experiments by the students.**

Content:**Nutrition**

- A. Water**
- B. Carbohydrates**
 - 1. Sugar**
 - 2. Starches**
- C. Lipids**
- D. Protein**
- E. Vitamins and Minerals**
- F. Metabolism**

Skills:**Basic skills – scientific****Calibrating a thermometer****Tenderizing meat****Verbal skills – describing carbohydrates in the diet****Analytical – identifying nutritional dietary needs****Choosing appropriate food preparation techniques****Purpose / Rationale of the unit:**

Students need be able to recognize the characteristics of carbohydrates, fats and proteins and their importance in food science.

In order to complete experiments and recipes using thermometers student need to be able to calibrate thermometers. Students will be able to select the best method to tenderize protein.

Students will be able to identify use of fat in food science.

New Jersey Core Curriculum Content Standards:

MATHEMATICS

4.1	All students will develop the ability to pose and solve mathematical problems in mathematics, other disciplines, and everyday experiences.
4.1.16	Recognize, formulate, and solve problems arising from mathematical situations, everyday experiences, applications to other disciplines, and career applications.
4.3	All students will connect mathematics to other learning by understanding the interrelationships of mathematical ideas and the roles that mathematics and mathematical modeling play in other disciplines and in life.
4.3.6	Recognize the connections between mathematics and other disciplines, and apply mathematical thinking and problem solving in those areas.
4.3.12	Recognize how mathematics responds to the changing needs of society, through the study of the history of mathematics.
4.9.1	Use and describe measures of length, distance, capacity, weight, area, volume, time, and temperature.

SCIENCE

5.4.2	Demonstrate how tools are used to do things better and more easily or to do tasks that could not otherwise be done.
5.10.14	Identify and explain factors that influence water quality needed to sustain life.

COMPREHENSIVE HEALTH AND PHYSICAL EDUCATION

2.1.8	Explain how health is influenced by the interaction of body systems and nutritional intake.
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CAREER EDUCATION AND CONSUMER, FAMILY AND LIFE SKILLS

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F	Safety
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9.2.2	Describe and demonstrate basic first aid and safety procedures.
9.2.3	Analyze the occurrence of workplace hazards.
9.2.4	Practice the safe use of tools and equipment.
9.2.5	Implement safety procedure in the classroom and workplace, where appropriate.

Time Frame of Unit:
9 to 10weeks

Instructional Activities:

1. **Teacher oriented worksheets.**
2. **Experiments in the food lab.**
3. **Calibrate thermometer using a variety of candy recipes.**
4. **Develop cream soup recipes**
5. **Use recipes depicting the variety of characteristics of fat.**
6. **View videos**
7. **Experiment showing the difference in meat tenderizers**
8. **Use recipes demonstrating the variety of water as a medium in recipes**

Materials and Resources:

Food Science and You chapters 6, 7, 8, 9, 10, 11.

Videos pertaining to Carbohydrate (Candy Making), Fats, Proteins, Vitamins, Minerals and Water.

Appropriate worksheets and hand outs

Appropriate recipes

Unit of Study

Unit Title: The Science of Food Preparation

Essential Questions of the Unit:

- 1. What are enzymes?**
- 2. What food products are acidic or basic?**
- 3. How does the pH of a product affect the quality of a food product?**
- 4. What are chemical leavening agents?**
- 5. Which leavening agents are the best to use in specific foods?**
- 6. What are natural leavening agents?**
- 7. What is the difference between bacterial fermentation and yeast fermentation?**
- 8. How is fermentation used in food preparation?**
- 9. How are different milk products used in food preparation?**

Assessments:

- 1. Teacher assessment through tests.**
- 2. Evaluation of food preparation by the student and teacher.**
- 3. Experiment and report on leavening agents and appropriate food products.**

Content:**Food Preparation****A. Enzymes****B. Acids and bases****C. Leavening agent****D. Fermentation and food****E. Dairy products and processing**

Skills:

Basic skills – scientific

Verbal skills – presenting reports on leavening agents

Analytical – identifying which acidic or basic foods result on the best food product.

Purpose / Rationale of the unit:

There are various scientific applications in food preparation.

The unit will enable students to:

- **know the importance of enzymes in food preparation**
- **identify foods which are basic and acidic**
- **understand the characteristics of leavening agents**
- **identify how fermentation is used in food production and processing**
- **prepare dairy products**

New Jersey Core Curriculum Content Standards:

CROSS CONTENT WORKPLACE READINESS SKILLS

4.2	Work cooperatively with others to accomplish a task.
4.3	Evaluate their own actions and accomplishments.
4.9	Use time efficiently and effectively.
5.4	Demonstrate safe use of tools and equipment.
5.5	Identify and demonstrate the use of recommended safety and protective devices.

MATHEMATICS

4.1.11	Recognize, formulate, and solve problems arising from mathematical situations, everyday experiences, and applications to other disciplines.
4.8.4	Use models to explore operations with fractions and decimals.
4.8.5	Use a variety of mental computation and estimation techniques.
4.9.1	Use and describe measures of length, distance, capacity, weight, area, volume, time, and temperature.
4.9.19	Choose appropriate techniques and tools to measure quantities in order to achieve specified degrees of precision, accuracy, and error (or tolerance) of measurements.
4.10.8	Develop, apply, and explain a variety of different estimation strategies in problem situations involving quantities and measurement.

SCIENCE

5.2.12	Select and use appropriate instrumentation to design and conduct investigations.
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9.2.3	Analyze the occurrence of workplace hazards.
9.2.4	Practice the safe use of tools and equipment.
9.2.5	Implement safety procedure in the classroom and workplace, where appropriate.

Time Frame of Unit:

8 to 9 weeks

Instructional Activities:

- 1. Teacher oriented worksheets.**
- 2. Experiments in the food lab.**
- 3. Test the pH of a variety of food products**
- 4. Study the different leavening agents by using research, recipe comparisons and experiments.**
- 5. Present the leavening project to the class as a group project.**
- 6. Prepare a variety of fermented products including friendship sourdough bread, pickles, and yeast products.**
- 7. Prepare cottage cheese**
- 8. Prepare a variety of dairy products**
- 9. Compare yogurts**
- 10. View a variety of videos**

Materials and Resources:

Food Science and You chapters 5, 12,14, 15, 16.

Video on Dairy farms

Appropriate recipes

Appropriate worksheets

Unit of Study

Unit Title: The Science of Food Processing

Essential Questions of the Unit:

- 1. How is dehydration used in commercial processing of food?**
- 2. How is food dehydrated?**
- 3. What are the advantages of canning food?**
- 4. How is food preserved?**
- 5. Why are additives added to processed food?**
- 6. What differences are there in packaging of food?**

Assessments:

- 1. Teacher assessment through tests.**
- 2. Evaluation of food preparation by the student and teacher**
- 3. Development and presentation of a dehydrated soup mix.**

Content:**Food processing**

- A. Dehydration**
- B. Canning**
- C. New techniques of food preparation**
- D. Additives**

Skills:**Basic skills – scientific****Mathematical****Language skills – developing a label for the dehydrated soup****Developing directions for the soup****Analytical – converting a soup recipe to a dehydrated product****Purpose / Rationale of the unit:**

Packaging and processing of foods is a tremendous part of the commercial food industry. Students will realize the importance of this industry as well as to their individual needs.

Students will be able to complete a variety of these activities in the foods laboratory by canning and dehydrating products.

Students will also recognize food additives and their importance.

New Jersey Core Curriculum Content Standards:

CROSS CONTENT WORKPLACE READINESS SKILLS

4.1	Set short and long term goals.
4.9	Use time efficiently and effectively.
3.1	Recognize and define a problem, or clarify decisions to be made.
5.4	Demonstrate safe use of tools and equipment.
5.5	Identify and demonstrate the use of recommended safety and protective devices.

LANGUAGE ARTS

3.1.15	Speak before a group to defend an opinion and present an oral interpretation.
3.3.16	Write technical materials, such as instructions for playing a game that includes specific details.

MATHEMATICS

4.6.5	Understand the various uses of numbers including counting, measuring, labeling, and indication location.
4.14.5	Follow, devise, and describe practical lists of instructions.

HEALTH AND PHYSICAL EDUCATION

2.1.6	Identify common health products and foods found in the home and correctly interpret labels, information, directions, and warnings.
2.1.13	Examine health product and food labels and advertisements, comparing accuracy, content, directions, and value.

SCIENCE

5.9.4	Investigate sources of heat and show how heat can be transferred from one place to another.
5.9.12	Explain how heat flows through materials or across space from warmer objects to cooler ones until both objects are at the same temperature.

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9.2.3	Analyze the occurrence of workplace hazards.
9.2.4	Practice the safe use of tools and equipment.
9.2.5	Implement safety procedure in the classroom and workplace, where appropriate.

Time Frame of Unit:**8 to 9 weeks****Instructional Activities:**

- 1. Teacher oriented work sheets.**
- 2. Experiments in the food lab.**
- 3. Prepare trail mix or granola from student dehydrated fruits**
- 4. Prepare beef jerky**
- 5. Prepare fruit leather**
- 6. Develop the student's own dehydrated soup mix.**
- 7. Prepare the packaging for the soup mix – complete with correct labeling**
- 8. Can and freeze apples for pies and compare**
- 9. Can applesauce**
- 10. View Videos**

Materials and Resources:**Food Science and You chapters 18, 19, 20, 21****Appropriate recipes****Appropriate worksheets**

Unit of Study

Unit Title: Developing Experiments in Food Science

Essential Questions of the Unit:

- 1. How are topics for experimentation chosen?**
- 2. Is research important to an experiment?**
- 3. What is the scientific experiment?**
- 4. What is in a conclusion?**

Assessments:

- 1. Teacher assessment through tests.**
- 2. Evaluation of food preparation by the student and teacher**
- 3. Development of a food science experiment of the student's choice and presentation to the class.**

Content:**Experiments****A. Topics****B. Research****C. Developing the experiment****D. Conclusion**

Skills:**Basic skills – scientific****Verbal skills – oral presentation of experiment****Drawing a conclusion****Analytical – developing an experiment of the student's choice
and supporting conclusion with data****Purpose / Rationale of the unit:****Students will be able to develop and complete an experiment pertaining to food science which includes recognizing the importance of gathering data and then evaluate the information and draw a conclusion.**

New Jersey Core Curriculum Content Standards:

CROSS CONTENT WORKPLACE READINESS SKILLS

3.1	Recognize and define a problem, or clarify decisions to be made.
3.2	Use models, relationships, and observations to clarify problems and potential solutions.
3.3	Formulate questions and hypotheses.
3.6	Plan experiments.
3.7	Conduct systematic observations.
3.8	Organize, synthesize, and evaluate information for appropriateness and completeness.
3.12	Interpret and analyze data to draw conclusions.

MATHEMATICS

3.4.25	Gather and synthesize data for researches from a variety of sources, including print materials, technological resources, observation, interviews, and audiovisual media.
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SCIENCE

5.2.6	Identify problems that can be solved by conducting experiments.
5.2.7	Design and conduct experiments incorporating the use of a control.
5.2.8	Collect and organize data to support the results of an experiment.
5.2.9	Communicate experimental findings using words, charts, graphs, pictures, and diagrams.

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9.2.4	Practice the safe use of tools and equipment.
9.2.5	Implement safety procedure in the classroom and workplace, where appropriate.

Time Frame of Unit:

3 weeks

Instructional Activities:

- 1. Teacher oriented work sheets.**
- 2. Experiments in the food lab.**
- 3. Select topic of interest for an experiment.**
- 4. Select recipe and decide on change for experiment.**
- 5. Research topic**
- 6. Develop data sheets relevant to recipe**
- 7. Conduct experiment**
- 8. Present experiment and conclusion to class**
- 9. View Videos**

Materials and Resources:

Food Science and You chapter 22

Appropriate worksheets

